REMARKS

In the Office Action, the Examiner objected to informalities and/or defects in claims 3, 4, and 6; rejected claims 1, 2, and 5 under 35 U.S.C. § 103(a) as being unpatentable over Ku et al. ("High Performance pMOSFETs . . . ," VLSI Tech. Digest, pg. 114-115, "Ku"); and rejected claims 3, 4, and 6 under 35 U.S.C. § 103(a) as being unpatentable over Ku in view of Kaneshiro et al. (U.S. Patent No. 5,427,964, "Kaneshiro") and/or Oda (U.S. Patent No. 6,288,430). Claims 7-14 are withdrawn; claims 2 and 3 are canceled; claim 15 is added; and thus claims 1, 4, 5, 6, and 15 remain under examination.

Applicants have amended claims 1, 4, and 6; canceled claims 2 and 3; and added new claim 15. Applicants have amended claim 1 to recite a "Ge/Ge+Si composition ratio $x(0.04<x<0.16)$" to even more clearly distinguish the present invention. Claim 4 has been amended to reflect its new dependency. Applicants have amended claim 6 and added new claim 15 which includes subject matter previously recited in canceled claim 3, both of which are submitted in this Amendment written in a manner consistent with the Examiner's comments at page 2 of the Office Action.

Applicants respectfully traverse the Examiner's objection to claims 3, 4, and 6 due to informalities and/or defects. However, to advance prosecution, Applicants have amended claim 6 in a manner consistent with the Examiner's comments at page 2 of the Office Action. The objection to claim 3 is rendered moot by its cancellation. The Examiner did not explicitly state the nature of his objection to claim 4 in the Office Action. However, claim 4 has been amended to reflect its dependence from new claim 15 which contains subject matter written in a manner consistent with the Examiner's

comments at page 2 of the Office Action. Accordingly, Applicants respectfully request that the Examiner withdraw his objection to claims 3, 4, and 6.

Applicants respectfully traverse the rejection of claims 1, 2, and 5 under 35 U.S.C. § 103(a) as being unpatentable over Ku because the rejection is improper. Applicants note that it is unclear if Ku is the only reference relied upon by the Examiner for this particular rejection.

At page 4 of the Office Action, the Examiner admits that Ku fails to explicitly disclose "a gate electrode . . . formed of a poly-$Si_{1-x}Ge_x$ layer having a Ge/(Si+Ge) composition ratio x ($0<x<0.2$)". However, the Examiner contends that such a composition is "within the art-known common range for poly-$Si_{1-x}Ge_x$" as shown in prior art such as Naruse et al. (U.S. Patent 5,356,821, "Naruse"). Id.

Applicants remind the Examiner that the M.P.E.P. sets forth that:

> [t]he distinction between rejections based on 35 U.S.C. 102 and those based on 35 U.S.C. 103 should be kept in mind. Under the former, the claim is anticipated by the reference. No question of obviousness is present. In other words, for anticipation under 35 U.S.C. 102, the reference must teach every aspect of the claimed invention either explicitly or impliedly. Any feature not directly taught must be inherently present. Whereas, in a rejection based on 35 U.S.C. 103, the reference teachings must somehow be modified in order to meet the claims. The modification must be one which would have been obvious to one of ordinary skill in the art at the time the invention was made.

M.P.E.P. § 706.02(IV). The M.P.E.P. clearly instructs that, for a proper 35 U.S.C. § 103 rejection, "the reference must teach every aspect of the claimed invention either explicitly or impliedly." Id. It is unclear from the rejection if the Examiner relies on Ku or proposes a combination of Ku and Naruse to teach each and every element recited in claim 1.

Moreover, "the reference teachings must somehow be modified in order to meet the claims." Id. Applicants remind the Examiner that M.P.E.P. § 706.02(j) states that "[i]t is important for an examiner to properly communicate the basis for a rejection so that the issues can be identified early and the applicant can be given fair opportunity to reply." The Examiner's rejections are not properly communicated, as there is no explanation of why one of ordinary skill in the art at the time the invention was made would have been motivated to make the proposed modification to meet the elements of Appellants' independent claims. The M.P.E.P. further instructs that,

> [a]fter indicating that the rejection is under 35 U.S.C. 103, the examiner should set forth in the Office action:
>
> (A) the relevant teachings of the prior art relied upon, preferably with reference to the relevant column or page number(s) and line number(s) where appropriate,
>
> (B) the difference or differences in the claim over the applied reference(s),
>
> (C) the proposed modification of the applied reference(s) necessary to arrive at the claimed subject matter, and
>
> (D) *an explanation why one of ordinary skill in the art at the time the invention was made would have been motivated to make the proposed modification.*

Id., italics added.

In this rejection, the Examiner has not set forth "an explanation why one of ordinary skill in the art at the time the invention was made would have been motivated to make the proposed modification." In particular, the Examiner does not explain how or why Ku must be modified, other than to make a generalized allegation that it is well known within the art "that the composition ratio x of less than 0.2 or 0.16 . . . for a poly-$Si_{1-x}Ge_x$ layer in the gate electrode (as readily evidenced in . . . Naruse et al.)" Id. Therefore, if the Examiner applies a 35 U.S.C. § 103(a) rejection based on Ku, he must

articulate how the reference must be modified by Naruse to supposedly teach each and every claim element. Claim 1 is allowable for at least this reason.

Moreover, if the Examiner is taking Official Notice and relies on Naruse, Applicants respectfully traverse any rejection under § 103 based on Ku and Naruse because the references teach away from one another.

> A prima facie case of obviousness can be rebutted if the applicant...can show that the art in any material respect 'taught away' from the claimed invention...A reference may be said to teach away when a person of ordinary skill, upon reading the reference...would be led in a direction divergent from the path that was taken by the applicant.

M.P.E.P. 1504.03(III) (citing In re Haruna, 249 F.3d 1327, 58 USPQ 2d 1517 (Fed. Cir. 2001)).

Naruse teaches away from the claimed range recited in claim 1. For example, at col. 2, lines 64-67, in reference to Fig. 6, Naruse specifically notes that the high resistivity of pure poly-silicon is "disadvantageous to high-speed operation of MOS transistors" (emphasis added). Accordingly, one of ordinary skill in the art would attempt to minimize the resistivity of the gate material to improve high speed operation and would choose a Ge content to minimize resistivity. Fig. 6 discloses that resistivity increases at or below a Ge/(Si+Ge) ratio of 0.2, and thus one of ordinary skill in the art would not use a gate electrode "having a Ge/(Si+Ge) composition ratio x ($0.04<x<0.16$)," as recited in claim 1. Accordingly, one of ordinary skill in the art would therefore not be motivated to combine Ku and Naruse, and thus no *prima facie* case of obviousness is established based on the cited references with respect to claim 1. Claim 1 is allowable for at least this reason.

Furthermore, at page 4 of the Office Action, the Examiner appears to assert that the claimed range is merely an "art-known result-oriented parameter" which would be discovered by "routine experimentation and optimization." M.P.E.P. § 2144.5(II)(B) states that "[a] particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation." Assuming *arguendo* that the Ge/Ge+Si ratio of "x (0.04<x<0.16)" were a result-effective variable, and Applicants do not concede that it is a result-effective variable, the data disclosed by Naruse indicates that the claimed range would be a non-optimal or workable range.

In addition, "[e]vidence of a greater than expected result may also be shown by demonstrating an effect which is greater than the sum of each of the effects taken separately (i.e., demonstrating 'synergism')." M.P.E.P. 716.02(a)(I) (citing Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ 2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989)). Applicants advise the Examiner that the present invention produces an unexpected beneficial result within the claimed range of (0.04<x<0.16), contrary to the data disclosed by Naruse discussed above. Such an unexpected result is by its nature *prima facie* non-obviousness, and claim 1 should be allowed for this additional reason.

For the above discussed reasons, claim 1 is allowable. Claim 5 depends from claim 1 and is allowable at least due to its dependence from independent claim 1. Claim 2 is canceled rendering its rejection moot. Accordingly, Applicants respectfully

request that the Examiner withdraw the rejection of claims 1, 2 and 5 under 35 U.S.C. § 103(a) based on Ku.

Applicants respectfully traverse the rejection of claims 3, 4, and 6 under 35 U.S.C. § 103(a) as being unpatentable over Ku in view of Kaneshiro and/or Oda. To establish a *prima facie* case of obviousness, three basic criteria must be satisfied. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify a reference or to combine references. Second, there must be a reasonable expectation of success. Third, the prior art reference (or references when combined) must teach or suggest all of the claim elements. *See* M.P.E.P. § 2143. Moreover, the requisite teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in Applicants' disclosure. *See In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991). *See* M.P.E.P. § 706.02(j).

Claim 1 recites "a gate electrode which is formed on the gate insulating film and formed of a poly-$Si_{1-x}Ge_x$ layer having a Ge/(Si+Ge) composition ratio x ($0.04 < x < 0.16$)." Claims 4 and 6 depend from claim 1, and thus incorporate each and every element recited in claim 1.

The Examiner admits that Ku fails to explicitly disclose a composition ratio of "x ($0.04<x<0.16$)," recited in claim 1. Office Action at 4. Given this concession, and for the reasons discussed above, neither Ku nor a combination of Ku and Naruse, teach or suggest "a gate electrode which is formed on the gate insulating film and formed of a poly-$Si_{1-x}Ge_x$ layer having a Ge/(Si+Ge) composition ratio x ($0.04 < x < 0.16$)." The

Examiner apparently concedes Kaneshiro and Oda also fail to disclose "a gate electrode . . . formed of a poly-$Si_{1-x}Ge_x$ layer having a Ge/(Si+Ge) composition ratio x ($0.04<x<0.16$)," given his reliance on Ku to teach the claimed "gate electrode."

Accordingly, no *prima facie* case of obviousness is established with respect to claim 1 based on Ku, Naruse, Kaneshiro, and Oda, either alone or in combination, because the cited references fail to teach or suggest the claimed "gate electrode which is formed on the gate insulating film and formed of a poly-$Si_{1-x}Ge_x$ layer having a Ge/(Si+Ge) composition ratio x ($0.04 < x < 0.16$)," recited in claim 1 and required by claims 4 and 6.

Claims 4 and 6 are allowable because the proposed combination of Ku, Kaneshiro, and Oda, fail to teach or suggest each and every element recited in claim 1 and required by claims 4 and 6. Claim 3 is canceled rendering the rejection of this claim moot. Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the rejection of claims 4 and 6 under 35 U.S.C. § 103(a) as being unpatentable over Ku in view of Kaneshiro and/or Oda.

New claim 15 is allowable at least due to its dependence from claim 1.

Accordingly, Applicants respectfully submit that claims 1, 4, 5, 6, and 15 are in condition for immediate allowance, and request the Examiner's prompt and favorable action in the form of a Notice of Allowance of all claims remaining under examination.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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